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Superconducting Receivers for Millimeter and Submillimeter Astrophysics

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Important information about the structure and evolution of the Universe can be obtained from astrophysical measurements at millimeter and submillimeter wavelengths. The noise in receiver systems used for such measurements should approach as closely as possible the fundamental limits such as photon noise and quantum fluctuations. Narrow line emissions are measured by such major projects as the recently launched *1.5B Herschel Space telescope and the 1B International Alma* project, which is now under construction. These projects are enabled by heterodyne receivers with superconducting hot electron bolometer (HEB) mixers and Quasiparticle (SIS) mixers. The temperature and polarization of broad band thermal sources such as the Cosmic Microwave Background and dust emission are being measured from a variety of high altitude telescopes in Chile and at the South Pole using large format arrays of transition edge sensor (TES) bolometers. The status of international efforts in this field will be described with special reference to the rapidly developing technology of very large format arrays of TES bolometers with SQUID-based output multiplexers.